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SHOCK OF OATS
IN FINLAND

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FRONT COVER

Shock of Oats in Finland

Farmer Arvo Lehtonen's heavy oat crop was due largely to generous use of fertilizer. Fertilizer has played an important part in the large postwar harvests not only of Finland but of many other countries in the world as well. (Photo by Ralph S. Yohe.)

BACK COVER

Finland—Prewar and Postwar

Finland lost 12 percent of its land to the Russians in the 1940's.

Credit for photos is given as follows: p. 72, Swiss National Tourist Office; pp. 77, 78, 80, Ralph S. Yohe; pp. 81-83, Ralph F. Holbrook.

NEWS NOTES

New Foreign Agricultural Service Replaces OFAR

A new Foreign Agricultural Service has been created within the U. S. Department of Agriculture. It replaces the former Office of Foreign Agricultural Relations. Secretary Benson named Romeo E. Short as director.

The new FAS occupies a major position in the Department's recently established six functional groups: Research, Extension, and Land Use; Commodity Marketing and Adjustment; Foreign Agricultural Service; Agricultural Credit Services; Departmental Administration; and Office of the Solicitor.

The Department is keenly aware that American agricultural exports receded 15 percent during 1952, and as a first order of business FAS will strengthen the work in developing foreign markets. Also, it will help the Department give stronger leadership in international cooperation as it involves agriculture.

Mr. Short, the new director, brings to FAS many years of experience in sizing up the needs of American agriculture. He has long been a prominent rice, cotton, and livestock farmer in Arkansas, and since 1947 has been vice president of the American Farm Bureau Federation. As a member of Secretary Benson's new staff, he first served as Director of USDA Agricultural Credit Services.

F. R. Wilcox, assistant general manager and treasurer of Sunkist Growers, at the request of the Secretary, assisted in setting up FAS. He is now returning to his organization in California but, as needed, will continue to serve as consultant to the new office.

FOREIGN AGRICULTURE ALICE FRAY NELSON, EDITOR

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United Kingdom Moves Toward Freer Agriculture

by MARY ELLEN LONG

For 7 years the United Kingdom has perpetuated a wartime system of governmental purchase and distribution of practically all food supplies and agricultural raw materials through operations of the Ministries of Food and Agriculture. Now the government is beginning to return these marketing functions to private traders.

Within the past few months the Ministry of Food has relinquished the control of certain imported foodstuffs, principally tea, coffee, and bananas. And announcements made early in 1953 indicate that eggs, cheese, and various edible fats and oils will be derationed in the early spring and that cereals, potatoes, and feedstuffs will be returned to private trade in the fall after the harvest.

The decision to liquidate the purchasing and distribution functions of the Ministry of Food presents many problems. The government hopes to avoid inflated prices, particularly to consumers, but at the same time it is committed to a program of agricultural expansion based on security to producers.

The policy of keeping food prices down has been in effect since 1941. During the intervening years the Ministry of Food has been buying the greater part of the output of British farmers at set prices, either directly or through authorized agents, and reselling it through various channels to consumers at lower prices. The difference between the retail price and the price paid to producers was made up by a government subsidy. This process of subsidizing food prices has been used not only to insure the consumer his fair share of essential foods but also to stabilize the cost of living and curb inflation.

The program of agricultural expansion to which the government is committed was also introduced in the early years of World War II. At that time the government advocated an efficient and productive agricultural industry as an essential safeguard in period of crisis. The program has been continued since the war to reduce the country's dependence on imported food supplies and save needed dollar exchange. In 1952 production was 40 percent higher than before the war, and the program was extended to 1956 with emphasis on an increase in food production to 60 percent above prewar levels.

> "Our task is to reconcile stability with freedom, and we propose in consultation with leaders of the National Farmers Union to do this by steering a mid course between the restrictions and interference of the Forties and the hazards of the loose freedom of the early Thirties. . . . We are moreover convinced that the basic aims of the Agriculture Act [of 1947] can be secured by methods which allow the natural economic forces to work so as to reward enterprise in the producer . . . the precise methods to be adopted will vary from commodity to commodity and there will be many difficulties and intricate questions to be solved."
> PRIME MINISTER WINSTON CHURCHILL, FEBRUARY 18, 1953.

To achieve the desired increase in production the government offered security to producers in the form of acreage payments, guaranteed prices, and guaranteed markets. Compulsory planting regulations were resorted to only in a few instances.

Under the Agriculture Act of 1947 minimum prices were guaranteed 2 to 4 years in advance for fat cattle, sheep, pigs, milk, eggs, wheat, barley, oats, rye, potatoes, sugar beets, and wool, and the farmers were assured of a market for their entire output. A procedure was set up whereby the government determines actual "floor" prices 1 year in advance for farm crops and 2 years in advance for livestock and livestock products after annual reviews held jointly between the Agricultural Departments and farmer representatives, particularly the National Farmers Union. These "floor" prices are supplemented by fixed prices for current production, but the advance price announcements give farmers a basis for planning their crop and livestock production ahead of time.

In current discussions with industry and farm representatives on procedure and price-fixing arrangements to permit decontrol of certain farm products, the government will seek methods to

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continue these "floor" prices. In determining new methods of price support the government will undoubtedly review such existing legislation as the Agricultural Marketing Acts of 1931 and 1933 as amended in 1949 and the import controls, especially import quotas, which were resorted to in the early 1930's.

For that reason, some of the earlier as well as current methods of aiding producers are here presented for review, on a commodity basis.

Grains

Under the Agriculture Marketing Act of 1931, direct subsidies were paid to producers of wheat, oats, and barley. The Wheat Act of 1932 guaranteed an average price of 10s. ($1.75) per hundredweight (112 pounds) for all wheat of a millable quality up to a maximum output of 1,512,000 short tons; this maximum was later increased to 2,016,000 short tons. Actual reimbursement to farmers consisted of a deficiency payment of the difference between the average price received and the guaranteed price. Payments were made from the proceeds of a levy imposed on wheat flour sold by millers or importers of flour. A similar deficiency payment was made to producers of oats and barley, the main difference being that this subsidy was paid from treasury funds rather than from a levy on millers and importers.

The first financial inducement to farmers to increase production of food crops during World War II was provided for in the Agriculture Act of 1939. Under the act, farmers were paid a subsidy of £2 (about $8) an acre for grassland plowed up after a lapse of 7 years and put into food crops. This plow-up subsidy was aimed at increasing production of crops that would save shipping space, particularly grains. During the war the United Kingdom increased the area devoted to bread grains from the 1936-38 average of 1.9 million acres to the 1943 peak of 3.6 million acres.

Following the war, however, when farmers no longer received the subsidy, they tended to let their land revert to grass and the government had to modify its wheat goals to lower acreage levels, despite campaigns to increase production with a view to saving dollar exchange.

Since early 1952, a direct subsidy of £5 ($14) per acre has again been paid to farmers who plowed up land seeded to grass for a period of 4 years or more for planting to certain grains, potatoes, and flaxseed. This subsidy was undoubtedly a factor in the rise of the winter wheat acreage during the past year.

Under the present decontrol plan for grains and feedstuffs, some £75 million ($210 million) in consumer subsidies will be removed at the end of the 1953 harvest period. Bakers will no longer have to use flour of 80-percent extraction rate, but they will continue to produce the "national loaf" made of this flour, and the subsidy on this type bread will be continued, though modified.

Livestock and Meat

Under the provisions of the Meat and Livestock Control Scheme, marketing of meat and livestock is controlled by the Ministry of Food.

A producer must give the Ministry 12 days' notice of his intention to sell livestock so that adjustments can be made to provide storage space. Cattle, calves, sheep, and pigs other than baconers are delivered to collection centers or marketplaces where they are graded by a panel consisting of a producer, a butcher, and a livestock auctioneer. The auctioneer acts as the agent of the Ministry of Food, arranges the terms of sale, and sees that the producer is paid for his stock. The livestock, now the property of the Ministry of Food, is shipped to slaughterhouses.

All fresh and frozen beef, mutton, veal, and pork whether home produced or imported, and all canned meats, are distributed to manufacturers and retailers through area wholesale meat supply associations operated by the Ministry. The quantities of meat allocated to manufacturers and retailers are governed by the ration requirements of registered customers.

Bacon is handled in a somewhat different manner. For a few years in the early 1930's, Pig and Bacon Boards were in operation, but now all home-produced bacon comes from licensed curers who, acting as agents for the Ministry of Food, buy baconers, cure and sell the bacon, and regulate wholesale distribution as the Ministry directs. Imported bacon, for which the Ministry of Food is also responsible, is handled on arrival by its agent, the Bacon Importers National Defence Association, Ltd., an association of prewar bacon importers.

To increase meat production since the war, direct subsidies have again been payable on steer and heifer calves raised to 12 months, and special

subsidies have been paid to hill farmers raising sheep and cattle. In addition, livestock farmers have been reimbursed by special grants for fertilizers and feedstuffs.

Potatoes

A potato marketing scheme was adopted in 1934 to stabilize the potato market. The scheme prevented the expansion of acreage and at the same time provided for the restriction of imports by licenses and duties. Prices were not fixed, but individual producers were registered and assigned acreage quotas based on previous production performance. During the war years, this policy was reversed, and the government emphasized the production of potatoes along with other bulky foods. By 1946 both planted acreage and production had increased to about twice the 1939 level, largely as a result of a plow-up subsidy of £2 (about $8) per acre paid to farmers during the war years under the provisions of the Agriculture Act of 1939. From 1948 through 1952 the potato acreage showed a constant decline which prompted the government to begin paying a plow-up subsidy again, as it was doing for grain. The subsidy was also £5 an acre ($14) and also began in 1952.

For the past several years the Ministry of Food has been buying most of the farmers' output of potatoes, particularly table stock, at a guaranteed price. The government expects to discontinue this policy in line with its program of decontrol, but the Ministry of Food has offered farmers a guaranteed market for the bulk of the 1953 harvest at fixed prices.

Contract Crops

The sugar beet industry in the United Kingdom was developed by a governmental subsidy and marketing program that originated soon after World War I. The subsidy is paid to the sugar-beet processors who in turn pay a guaranteed contract price to farmers for their beets. This furnishes an inducement to the farmer to grow all the beets contracted for or needed by the processor for the maximum output of the country's factories.

The Agricultural Marketing Act of 1931 provided for a hop marketing scheme and for the creation of a Hop Marketing Board to buy all hops from the producers. This Board alone has the right to negotiate prices and it can make contract sales to brewers even before the crop is harvested, thus providing security to the producers. At the time this system was introduced the tariff on imported hops was equivalent to 50 percent of the import value. In recent years prices have advanced to such a degree that the tariff is now equivalent to only about 16 percent, but limitations of foreign exchange provide domestic producers with effective protection.

Fruits and Vegetables

Supplies of certain fruits and vegetables have been regulated since the early 1930's by import restrictions such as licenses, quotas, and tariffs. No attempt was made to set up marketing schemes for fruits and vegetables until after the war. In 1949 the Agricultural Marketing Acts of 1931 and 1933 were amended to provide for a Tomato and Cucumber Marketing Scheme; the scheme was approved by the Minister of Agriculture but never functioned to any significant degree. A similar scheme proposed for the marketing of garden peas was not approved. Apples and pears are the subject of the latest proposal. On February 12, 1953, parliamentary approval was given to the Minister of Agriculture for the creation of an apple and pear marketing scheme, subject to the acceptance of registered producers by April. The primary purpose is to expand demand for British produce and to maintain the economic stability of the industry through the distribution of better quality products to consumers at the lowest possible retail price.

Milk

In 1942 the Milk Marketing Board of the Ministry of Food became the sole purchaser of milk from producers in England and Wales. The Board fixes the price, and takes title to all milk upon delivery to the pasteurizing or bottling plant. A premium is paid for milk from tuberculin-tested herds. In certain areas herds are tested without charge to the owner. Eventually, the testing program is to be extended throughout the country.

Eggs

In June 1941 the Egg Control Scheme went into effect, providing for the rationing of shell eggs to consumers and for the control of retail prices of shell eggs by means of a government subsidy. That scheme was in force until March 26, 1953,

when shell eggs were derationed and the subsidy, valued at about £20 million ($56 million), was removed. For the time being—until a permanent scheme is worked out—much of the existing machinery of the Ministry will operate in order to assure producers a guaranteed market: A "floor" price will be made effective by government purchases of fresh eggs for processing in periods of surplus supplies.

Effects of Decontrol

As a result of the abolition of controls and the transfer of government buying processes to private trade channels, the British farmer can expect to enjoy more freedom, although it will vary in degree from commodity to commodity. He will have greater latitude in the development of his traditionally preferred industry—livestock production—than he has had in the past decade. The extent of his freedom in the marketing of his products is still unknown; much will depend on whether the marketing boards (whose functions were taken over during the war by the Ministry of Food) are revived and what their new functions will be.

Another unknown in the move toward a freer agriculture in the United Kingdom is the extent to which the quantity of agricultural output will be affected by the removal of subsidies on feedstuffs and the reduced subsidies on fertilizers; the government has not completely formulated its price policy in this regard. Every assurance has been given farmers, however, that the guaranteed prices and assured markets provided for in the Act of 1947 will be maintained. If market prices of some products should drop below the guaranteed prices, steps may be taken to make the price and market guarantees effective.

To the consumer, decontrol may bring some increases in retail prices of food, but it may also bring improvement in food quality; in several marketing plans recently adopted—for eggs, sausages, potatoes, and wheat flour for bread, for example—encouragement is being given to providing quality products for the consumer market.

The present decontrol measures should not be construed as increasing the marketing opportunities for foreign suppliers of agricultural products to the United Kingdom. Most imports from the dollar area are still subject to restrictions.

Getting the Sea Out of English and Dutch Soil

Repairing and rebuilding dikes and farmsteads and clearing debris from the land have been major activities during the past 2 months along the English Channel, where, early in February, the worst storms in centuries swept the tidal water of the Channel up the rivers and through the dikes and across thousands of acres of fine farm land in England and the Netherlands.

With the rushing water from the Channel and the overflowing rivers came tons of sediment—silt and clay—that was deposited on the land. The considerable area that was flooded with fresh river water can be planted as soon as it has been pumped dry or as soon as the flood has receded, despite the layers of silt and clay.

But the land flooded with Channel water will have to be rehabilitated before it can be planted, for that water was salt. Salt water saturates the clay and silt with sodium chloride and other sea salts, making the soil tight and gummy. Soil in flooded areas will not return to normal for many years unless it is specially treated.

Application of gypsum, or calcium sulfate, as a soil amendment has proved an effective treatment. Gypsum is spread on the land in large quantities—5 to 8 tons an acre. The gypsum dissolves and the calcium displaces the sodium, making the soil more granular and friable and facilitating drainage. The sea salts are leached out by rain water.

Farmers should be able to get fairly good yields of certain crops in a year on land treated with gypsum and they should be able to get satisfactory yields in 2 years.

This year's crop output especially in the Netherlands will be cut, however. The flooded area in that country represents almost 6 percent of the agricultural land. Nearly one-fourth of the flax and sugar beets are grown in the flooded area and 15 percent of the wheat and nearly 9 percent of the potatoes produced for food. In England the flood covered less than 1 percent of the farm land of the United Kingdom but that land is some of the most productive. It lies below sea level and, like the lowlands of the Netherlands, is protected by dikes. Most of it is devoted to intensive cultivation of cash crops, principally potatoes and other root crops and green vegetables.

Commercial Fertilizer Situation

by Q. MARTIN MORGAN

The unprecedented world demand for food and fiber during the war and postwar years has led to a tremendous increase in the use and production of commericial fertilizers. In 1951-52 farmers of the world used 65 percent more of these fertilizers than they had before the war and manufacturers produced 70 percent more.

At the present time, production of nitrogen fertilizer may be running a little ahead of demand. If stocks accumulate and the world price drops, there may be a wider market for nitrogen fertilizer and for other commercial fertilizers as well, since nitrogen is most efficient when used in proper balance with phosphate and potash.

Phosphate and potash fertilizer cannot be as widely manufactured, however, as nitrogen, much of which is now produced as synthetic compounds from the air. But surveys are being made to find sources of raw materials for phosphate and potash in many areas, and various methods of manufacture are being studied.

In areas where commercial fertilizer is now too expensive to use on secondary crops, efforts are directed toward more economical distribution of fertilizers and, where warranted, toward the production of higher analysis fertilizer in which plant nutrients are concentrated.

As the market for commercial fertilizers is widened, much of the new demand will undoubtedly be met from local production unless the traditional production-consumption pattern in commercial fertilizers changes, which is unlikely in the near future, for the major producing countries as a group have always used most of the fertilizer they manufacture. For example, in 1951-52, a little more than 90 percent of the world supply of commercial fertilizer outside Russia was produced by 16 countries and 85 percent was used in those countries. Generally, they are the most progressive agricultural countries; the ones in which the economic position of the farmer has stimulated increased use of commercial fertilizers. Even in these countries, however, farmers are often reluctant to use as much commercial fertilizer as is generally believed to be the most practical, profitable level. To overcome this reluctance, many governments, industries, and farm groups are working together to expand research on the response a crop makes to an increase in fertilizer and on the levels of use that are profitable under different conditions. They are going even further: they are interpreting and disseminating the findings.

Ten of the major fertilizer producing countries are in Europe, where production and supplies of commercial fertilizers were seriously curtailed during the latter stages of the war and the early postwar years by war damage and shortages of raw materials, repair equipment, and transportation facilities. By 1949, however, Europe had surpassed its prewar level of production by 18 percent and in 1951-52 it had gone about 25 percent above. In this recovery, Germany was the only principal fertilizer producing country in Europe that lagged behind. By 1949 Germany was still below prewar levels; and in 1951-52, although it exceeded prewar output in potash, it was still considerably below prewar in nitrogen and phosphate. Its increases were generally in Western Germany; in 1951-52 that area had about two-thirds of the nitrogen, nine-tenths of the phosphates, and one-half of the potash.

Total consumption of commercial fertilizers in Europe has risen too. Consumption in the major producing countries in 1951-52 was 13 percent higher than before the war. Even so, European farmers are using only about two-thirds the commercial fertilizer called for as the current desirable level of use in the goals established by the Organization for European Economic Cooperation. Since 1950 there has been a marked slowing down of the upward trend of fertilizer use in Europe. Blamed in general for the slowing down are inadequate farmer credit and the high cost of fertilizer in relation to farm commodity prices. Getting farmers to use more fertilizer is the fundamental but unsolved problem in connection with Western European efforts to achieve greater agricultural production.

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Spreading chemical fertilizer on farm land in Switzerland. World production and use of commercial fertilizers have set successive annual records since the war years to help meet growing needs for food and fiber.

In Asia, supplies of commercial fertilizers and production were also low at the end of the war, primarily because of war damage and the shortages of materials in Japan, the leading producing country. But, by 1949, Asia too was producing more commercial fertilizer than it had before the war.

In Japan the recovery of the chemical fertilizer industry has been a highlight of the industrial rehabilitation since the war. Occupational authorities began immediately to rebuild the industry. Munitions plants were reconverted to nitrogen fertilizer, scarce materials were made available, and subsidies were authorized to stimulate consumption. The result was a rapid recovery in production of nitrogen and phosphate fertilizer and in consumption of all fertilizer.

Japan has the plant facilities to produce at least 60 percent more nitrogen fertilizer than it did in 1951-52; its phosphate industry is also capable of larger output. A general shortage of electrical power has been the principal obstacle to greater production of nitrogen, and the absence of a profitable export market has been advanced as the reason for operating the phosphate industry below capacity.

However, manufacturers are short of capital and interest rates are high; therefore, they are not able to carry stocks for extended periods. The lack of firm commitments discourages a maximum effort to produce both nitrogen and phosphate for export.

In Oceania, Australia and New Zealand are the major producers and users of chemical fertilizers. Australia produces a small amount of nitrogen, and both Australia and New Zealand import some nitrogen and potash but these fertilizers make up only 10 percent of the commercial fertilizers used in the area. Phosphate, the fertilizer most needed and most widely used, is produced in both countries and imported in small quantities by New Zealand. Production and use of phosphate fertilizer in these countries during 1951-52 were nearly double prewar levels. And the demand will probably continue to grow. According to rough estimates, New Zealand alone will need as much phosphate eventually as is now used in all of Oceania.

In Latin America, Chile is the only important exporter of commercial fertilizer; it has traditionally exported nitrogen. Chilean nitrogen is not a synthetic or a byproduct; it comes from natural deposits of sodium nitrate, estimated as equivalent to 30 million tons of nitrogen. Over the past 25 years, Chile's annual production of sodium nitrate has consistently been equivalent to about 275,000 tons of nitrogen; domestic consumption has generally remained at less than 10,000 tons annually. Chile also produces and uses small quantities of phosphate and potash. Potash raw material is plentiful in Chile but the industry produces only enough potash to meet the small domestic demand. Phosphate is the fertilizer most needed in Chile; when farmers use it, their crop yields are invariably higher but their profits are not always greater because the cost of phosphate is generally too high. Phosphate is expensive in Chile because there is not enough to meet demand, local production and transportation costs are high, and imports are restricted.

In North America the most spectacular fertilizer development has taken place in the United States, where nitrogen plants producing synthetic ammonia

TABLE 1.—*Production of commercial fertilizers in principal countries for specified periods* [1]

[In thousand short tons]

Country	1938-39 [2]			1946-47 [3]			1949-50 [4]			1951-52 [5]		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
Belgium and Luxembourg	103	318		139	200		198	319		236	396	
Denmark		65			67			85			81	
France	216	364	641	159	[6] 324	657	253	524	919	314	571	1,014
Germany [7]	917	761	2,051	303	141	827	619	401	2,023	777	470	2,535
Italy	121	232		53	174		151	302	1	205	355	1
Netherlands	109	113		44	110		124	187	2	250	173	2
Norway	99	6		103	11		165	15		176	22	
Spain	4	64	28	4	150	182	3	143	182	8	160	198
Sweden	9	55		23	77		26	96		18	109	
United Kingdom	137	174		254	309		303	377		307	281	1
Canada	54	29		194	127		158	127		165	116	
United States	265	683	317	743	1,798	896	1,155	2,135	1,093	1,211	2,265	1,370
Chile	246	10	11	288	8	11	267	16	2	299	23	13
Japan	282	332	5	178	78	1	417	259		504	314	
Australia	6	264		5	270	2	11	365		12	418	
New Zealand		105			130		2	149			135	
All others	262	195	33	135	343	44	127	513	6	386	670	7
World total	2,830	3,770	3,086	2,625	4,317	2,620	3,974	6,013	4,228	4,868	6,559	5,141

[1] Excluding U.S.S.R.
[2] Food and Agriculture Organization of the United Nations, *Yearbook of Food and Agricultural Statistics, 1950*, Vol. IV, Pt. 1.
[3] Food and Agriculture Organization of the United Nations, *Commercial Fertilizers* (Commodity Series, Bulletin No. 7), September 1949.
[4] Food and Agriculture Organization of the United Nations, *Fertilizers—A World Report on Production and Consumption*, August 1951.
[5] Food and Agriculture Organization of the United Nations, *Fertilizers—A World Report on Production and Consumption*, August 1952.
[6] 10 months.
[7] Includes Soviet Zone after World War II.

have been greatly expanded in the past decade. Annual capacity has grown from 390,000 tons of synthetic nitrogen in 1940 to 1,240,000 tons in 1945 and to 1,616,000 tons in 1951. And it is still growing. Each year the United States, traditionally a net importer of nitrogen, produces a larger share of its greatly accelerated domestic requirements for nitrogen fertilizer. It is also meeting more and more of its need for potash and continuing to export phosphate. Production of all fertilizers during 1951-52 was about four times the 1938-39 output. Since consumption was only about 3½ times greater, it seems possible that the United States will be self-sufficient in fertilizer materials within the next 3 or 4 years.

More efficient use of fertilizer is being stressed in the United States, too. The Department of Agriculture and the land-grant colleges have launched a Nation-wide program through which it is hoped that, by greater use of fertilizer, the productivity of the Nation's soils will be built up and net returns to farmers will be increased. The fertilizer industry is supporting the program and current indications are that the fertilizer supply goals for the 1955 crop year will be met. The goals call for 2,185,000 tons of nitrogen, 3,485,000 tons of phosphate, and 2,185,000 tons of potash. These figures represent an increase of 70 percent in nitrogen, 55 percent in phosphate, and 51 percent in potash fertilizer above supplies available for the 1951 crop year.

Canada has traditionally produced synthetic nitrogen fertilizer for export; about four-fifths of its increasing nitrogen production is exported each year. It produces about enough phosphate for its own fertilizer needs but imports potash. Canada has steadily increased its use of commercial fertilizers in the past decade, but consumption is still relatively low, for Canada's extensive agriculture does not lend itself to greatly increased use of these fertilizers.

TABLE 2.—*Consumption of commercial fertilizers in principal countries for specified periods* [1]

[In thousand short tons]

Country	1938-39 [2]			1946-47 [3]			1949-50 [4]			1951-52 [5]		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
Belgium and Luxembourg	69	111	68	98	93	81	90	105	107	89	95	131
Denmark	56	71	50	45	58	55	66	90	93	80	90	149
France	240	328	338	[6] 223	319	386	[6] 253	[6] 426	391	309	463	463
Germany [7]	792	611	1,444	352	205	667	504	453	1,254	629	558	1,268
Italy	142	289	20	69	162	10	132	273	18	174	320	22
Netherlands	105	116	132	102	132	76	158	138	169	176	120	174
Norway	12	17	24	23	29	26	41	41		35	39	49
Spain	35	66	31	[6] 34	112	18	42	139	39	66	154	61
Sweden	33	59	61	43	74	48	66	109	59	80	117	62
United Kingdom	66	187	83	157	328	135	231	455	263	193	305	182
Canada	11	40	23	29	94	52	34	125	62	36	116	63
United States	381	744	393	[6] 784	1,736	860	[6] 1,031	2,060	1,124	[6] 1,405	2,230	1,515
Chile	11	8		7		5	8	17	2	9	17	2
Japan and Ryukyus	279	356	124	[6] 266	78	61	334	256	132	487	267	128
Australia	14	245	7	12	270	6	17	365	9	17	418	9
New Zealand	5	115	7	1	130	3	3	159	5	2	146	16
Other countries	521	408	180	401	536	275	747	726	331	919	884	626
World total	2,772	4,001	2,985	2,646	4,356	2,764	3,757	5,937	4,058	4,706	6,339	4,920

[1] Excluding U.S.S.R.
[2] Food and Agriculture Organization of the United Nations, *Yearbook of Food and Agricultural Statistics, 1950*, Vol. IV, Pt. 1.
[3] Food and Agriculture Organization of the United Nations, *Commercial Fertilizers* (Commodity Series, Bulletin No. 7), September 1949.
[4] Food and Agriculture Organization of the United Nations, *Fertilizers—A World Report on Production and Consumption*, August 1951.
[5] Food and Agriculture Organization of the United Nations, *Fertilizers—A World Report on Production and Consumption*, August 1952.
[6] Includes dependent overseas territories.
[7] Includes Soviet Zone after World War II.
[8] Includes territories.
[9] Includes South Korea.

TABLE 3.—*Exports and imports of commercial fertilizers by principal countries for specified periods*
[In thousand short tons]

Country	Prewar [1]						1951-52 [2]					
	Exports			Imports			Exports			Imports		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5 [4]	K_2O	N	P_2O_5	K_2O
Belgium and Luxembourg	35.9	238.8	154.7	17.2	54.4	227.5	165.1	301.4	255.0	4.2	0.9	462.0
Denmark		45.8		33.6	5.2	47.4				78.2	12.0	134.9
France	6.0	77.9	242.1	34.9	23.3	2.1	[3] 15.1	[3] 21.5	[3] 497.7	[3] 42.0		
Germany	130.3	9.7	442.7	18.3	127.0		[4] 131.5	[4] 2	[4] 892.0	[4] .4	[4] 51.6	
Italy	.2	.4		28.2	5.5	16.1	[3] 32.3	[3] 1.1	[3] —	[3] 42.8	[3] 34.1	[3] 46.9
Netherlands	53.8	74.7	.3	43.8	89.5	33.9	97.2	121.3	2.2	19.0	62.9	174.4
Norway	81.7			.1	11.6	5.8	149.7	.2			16.7	43.5
Spain	.5	.9	107.9	111.5	2.4	5.3			132.3			
Sweden	.2	2.3		22.4	7.8	5.6				56.5	7.4	60.0
United Kingdom	74.3	32.5	.7	16.1	14.4	69.5	[3] 75.7	[3] 4		[3] 5.2	[3] 280.9	[3] 266.8
Canada	43.3	.8		7.9	23.4	24.5	149.2	32.6		1.9	35.0	40.0
United States	11.6	17.8	30.1	164.5	26.5	178.2	60.2	90.0	66.1	292.2	37.9	245.5
Chile	266.4	3.2		1.4	1.6		[3] 305.0		11.6		[3] 1.1	
Japan	48.1	45.7	1.2	72.0	22.1	108.5	[3] 47.2			[3] 12.4		[3] 127.9
Australia		.7		9.7	.4	10.6		.2		9.6		9.5
New Zealand				4.7	2.6	19.0				[3] 1.6	[3] 11.7	[3] 7.6
Total	752.3	551.2	979.7	586.3	417.7	754.0	1,228.2	568.9	1,856.9	566.0	552.2	1,619.0
Net exports	166.0	133.5	225.7				662.2	16.7	237.9			

[1] Average 3 recent years prior to World War II. International Institute of Agriculture, *International Yearbook of Agricultural Statistics, 1939-40*, Rome, 1940. [2] Foreign Service Reports. [3] 1950-51. [4] Includes estimates for East Germany. [5] Calendar year 1950.

Libyan Farm Co-op*

Cooperation in marketing farm products and purchasing farm supplies—often recommended as an aid for small farmers in underdeveloped countries—has long played an important part in the lives of hundreds of farmers in northwestern Libya. Their cooperative association, the Consorzio Agrario, was organized more than a quarter of a century ago by 17 farmers, of whom 15 were Italians and 2 Arabs. Though the membership of the cooperative is still preponderantly Italian, the number of Arabs taking part has increased substantially in recent years. Today almost 300 of the association's 1,300 members are Arabs.

The cooperative is headquartered in Tripoli but has agents in outlying towns through whom seed, fertilizer, and other supplies can be purchased at the Tripoli price. In the office building in Tripoli, there is a well-stocked retail store, which sells hand tools, twine, wire, insecticides, etc. Nearby is a feed warehouse equipped with grinding and mixing machinery, and warehouses for fertilizer, olive oil, and farm machinery. The cooperative has a repair shop here, too. The shop is equipped to overhaul the machinery owned by the cooperative.

Crops are bought from member and nonmember farmers on both a cash and a pool basis. When a crop is sold on a pool basis, the farmer is paid approximately 75 percent of the current value of the crop and receives the balance when all of the crop has been sold.

The cooperative makes advances of seed, fertilizer, custom farm work, etc., to members for the current crop. The member's application for such credit is reviewed by a credit committee from the cooperative. Two representatives of the Libyan Department of Agriculture sit on this committee. The co-op member must submit a formal request for credit and an inventory of his production equipment, livestock, fruit trees, etc. According to Libyan law, advances like these that members get from the co-op constitute a lien against the crop.

Losses on production loans over the years have amounted to only about 2 percent. During the war years and the years immediately following, the cooperative was the only source of credit open to many farmers. For that reason, they could not afford to lose this credit source by defaulting on loans.

*By A. J. Rehling, Agricultural Extension Agent, American Embassy, Tripoli, Libya.

Finland Resettles its War-Displaced Farmers*

Russia took from Finland nearly 18,000 square miles of land in the early 1940's. To escape life under the Soviets, 480,000 people fled from the area, looking to Finland for home and refuge. This is the story of two of the farm families that Finland resettled on land of their own.

by **RALPH S. YOHE**

Johannes Kaipainen, his wife, Katri, and his father and mother live in a small, new, yellow house on their 85-acre farm near Kytäjä in southwestern Finland.

Last fall, Kaipainen was busy cutting his 2½ acres of wheat, his acre of barley, and his 9 acres of oats. He and his father cut the grain with scythes, and his wife and his mother put it on tall poles to dry in the warm autumn sun. Then it was taken to the small, newly painted red barn in a two-wheeled, horse-drawn cart.

Later, there were potatoes to dig from the half-acre patch at the edge of the clearing. The potatoes grow big in the heavily fertilized, newly cleared soil. The whole family turned out to pick up the fat, brown tubers. This winter, Kaipainen will cook the potatoes to feed to his three pigs, or mash and ration them to his five Ayrshire cows.

During the winter months, he and his father have been spending much of their time clearing off the scraggly pine trees along the edge of the clearing to add new land to their 16 acres of cropland. They hope to clear 15 acres more, so that way eventually they will have around 30 acres of crop and hay land. Most Finnish farms have less than 30 acres of cultivated land.

This winter when the snow is too deep for them to cut away the trees, they will plaster the milkhouse. And a new silo will have to be built before grass-cutting time early next summer.

On Sundays, the family walks down the newly made road, piled high with snow, to the new wooden community church. Here they visit with their neighbors, many of whom they have known for as long as they can remember. They were neighbors even before Johannes, with his bride Katri, left his father's farm in south Karelia and started farming as a tenant on the nearby farm of Finland's hero, Marshall Mannerheim. Although it is several hundred miles from south Karelia to the farm in southwestern Finland where Johannes Kaipainen and his family have been living since May of 1947, the Kaipainens still have many of the same neighbors.

This seeming paradox is only one of many that I encountered last summer as I traveled through Finland, which for nearly 800 miles borders Russia and the Iron Curtain.

It was then that I visited the Kaipainen family and their new farm. As I sat in the room that serves as kitchen, living room, and dining room, I heard their story. With slight variations, it was the story of the more than 40,000 farm families who once lived in the nearly 18,000 square miles of Finland taken by the Soviet Union during the war.

At the end of the war Finland was faced with an enormous job. It had to find new farms for these people and new homes for those who fled from the 146-square mile Porkkala harbor district near Helsinki, which Finland was forced to lease to Russia for 50 years. It had to rebuild the cities, factories, and homes destroyed in what was left of Finland. And it was confronted with the tremendous undertaking of building new factories to deliver $760 million of reparation goods to the Russians. Three-fourths of these goods were metal goods, some of which, like fishing trawlers and locomotives, had never before been made in Finland, and for which nearly all raw materials had to be purchased from abroad. In addition, high penalties had to be paid

* The beginnings of this story were told by Eric Englund in "Finland's Agriculture Looks Toward Recovery," *Foreign Agriculture*, June 1948.

Mr. Yohe, who traveled through Finland last summer, is Science Editor, *The Prairie Farmer*, Chicago, Ill.

for failure to deliver reparation goods on time.

With speed, the Finnish Government moved to resettle its displaced persons. The country needed their work. And the country, faced with the huge reconstruction and reparation cost, could not afford the political ferments of detention camps. As Veikko Vennamo, General Director of the Settlement Board, explained to me when I visited his office in Helsinki, "It was a struggle with time. And in an hour when the strength of the people was strained to the utmost, the job had to be done as quickly and cheaply as possible."

In 1945 the Parliament passed the Land Acquisition Act, which contained provisions for resettling not only the 46,000 farm families from territory ceded to the Russians, but also the 110,000 disabled front line soldiers, war widows, and orphans who had been promised land during the war, and the farm workers who would lose their jobs as land was taken from the larger farmers.

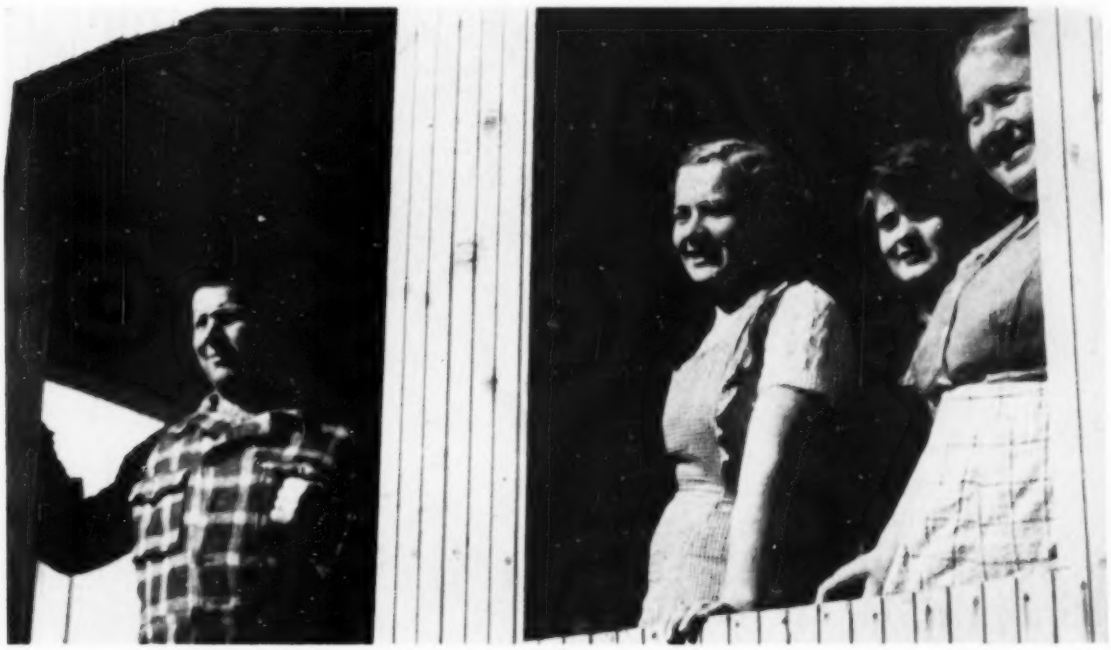
The first land to be used for making new farms was government-owned land. More than a third of all the land in Finland was owned by the national government. But this land was nearly all in forest, much of it unfit for cropland. All together, about one-fourth of the land for new farms came from government-owned property.

Then, land for the new farms came from holdings of the municipalities, the church, business corporations, city farmers, speculators, and owners of neglected farms. These groups furnished more than 40 percent of the land.

It was apparent, however, that if the new farmers like the Kaipainens were to get cultivated land, particularly in southern Finland, land had to be taken from even the medium-size owner-operated farms, for Finland had few large estates. (In the whole country there were fewer than 7,000 farms with 250 acres or more of cropland.) From these medium-sized farms came 30 percent of the land used to establish new farms; it was expropriated or sold voluntarily by farm owners. Those who sold voluntarily were given special benefits.

To ease the burden of compulsory expropriation, a sliding scale was used. Forest land was converted into a cultivated-acreage equivalent. This meant that a small farmer with only 60 acres of cropland, or its equivalent, surrendered only 10 percent of his land. But a larger farmer with 2,000 acres of equivalent cropland lost up to 80 percent of his land.

When possible, land was also purchased from people who wanted to sell all or part of their land. These people, along with those forced to give up land, were paid in government bonds at a fixed local



The Johannes Kaipainens, one of Finland's resettled farm families.

price of land. The inflation that was later to hit the country was to reduce the buying power of the bonds by four-fifths. But the farmers and landowners could use the bonds to pay the very heavy capital tax levied on all property owners.

The land where the Kaipainens and their neighbors now live was once part of a 20,000-acre estate. More than 12,000 acres of the land, most of it in forest, was taken over to make farms for more than a hundred displaced families like the Kaipainens.

As Kaipainen and I walked down the path from the house to the barn half hidden among the pine trees, he told me that his father and he had built the barn; the timber came from logs cut as the land was cleared. The family made nearly all their furniture, too.

For nearly 2 years after the Kaipainen family came to Kytäjä, they lived, along with their neighbors from Karelia, in a group of nearby barracks. Both the men and the women worked to clear enough land for houses and barns. To help get the land ready for new farms all over Finland, a private stock company, supported by government capital, was set up. Huge tractors and land clearing machines pushed the thick forest aside. Other machines dug drainage ditches. But the company could not do all the work, for there were too many acres to be cleared. By far the greater part had to be done by the settlers themselves with simple tools and horse power.

The average size of the settler's farm in Finland is 75 acres, 35 acres of which is cropland. Since much of the land in Finland is ideally suited for forests, each farm has an average of 40 acres to be left in forest land.

By May 1947 the Kaipainens had the red tile on the roof of the house and pine siding nailed in place. At last—7 years after fleeing from their home in south Karelia—the Kaipainens again had a house to live in.

So far as possible, whole communities were settled together. That is why today the Kaipainens have the same neighbors they had in their old home in Karelia. Even the school teachers are the same

In Finland, farms have been cut out of the forests to settle families that fled from Soviet-controlled areas of the country.

teachers who taught in the old community.

Had the Kaipainens spoken Swedish, as does one family out of every 10 in Finland, they would have gone to a new farm in one of the Swedish-speaking farm communities along the southern or western coasts, for even the cultural background of the families was considered when they were relocated.

The farmers from southern Karelia were all settled in southern Finland; those who lived in northern Karelia were settled in the north. In the same way, the farmers who lost their farms along the waistline of middle Finland were moved just across the new border. The few farmers in the far north region of Petsamo were given farms in northern Finland. That way the farmers live in nearly the same kind of farming region as they did before and need not learn a new type of farming. It is no coincidence that the crops Kaipainen and his neighbors grow today—wheat, barley, oats, and potatoes—are the same crops they grew on their farms in Karelia.

Kaipainen told me that he was the first farmer in the community to be given unrestricted ownership of his land. During the first 5 years, ownership of the new farms was on a restricted basis: the land could not be sold. During this time the farmer had an opportunity to learn whether he could succeed on the new farm.

Kaipainen's loans are now paid. But most of his neighbors are not so fortunate. The farmers who lost land in ceded territory were given bonds that they could use to purchase new land. But credit was needed to help build new houses and barns and to tide the family over until the first harvest. It took money to buy livestock and equipment.

Both government and private loans were available to the new farmers. Loans were made through cooperative credit societies and savings banks already located in nearly every community. The government guaranteed from 25 to 35 percent of the loans. Interest rates were low.

In addition, the government gave direct payments for clearing the land. But even so, the average settler finds that he still has loans and mortgages on 40 percent or more of all his property.

Across the road from the Kaipainens live the Heikkis, whom I also visited. They have an 85-acre farm, which has only 12 acres of cleared land, much of which is still covered with stumps. About 30 acres of land is yet to be cleared; the rest will be left in forest to furnish extra income and work during the long winter months.

Kaimo Heikki once managed a large farm in Karelia and was eligible for land since he had been a frontier soldier during the winter wars and later during the Second World War. His was a "cold farm"—land with no cleared cropland or buildings. In order to add to the acreage of cultivated land, the government gave special land clearing payments to farmers who were willing to clear their own farms. About 12,000 "cold farms" have been established.

Shortly after Heikki, with his wife and their three daughters, arrived 2½ years ago, he started a one-man sawmill, using a crawler tractor that the Germans had left behind. Some of the family's income still comes from the sawmill, for the farm is not as yet self-supporting.

The Heikki's house had just been completed when I visited them. Heikki cut and sawed the logs into boards himself, and the whole family helped put up the house and the barn. They even shaped and baked the tile for the roofs.

Regardless of the hard work of families like the Kaipainens and the Heikkis, the job of settling more than 100,000 families could not have been done by the families alone. New roads had to be built, electric lines expanded, and new drainage ditches dug. Planning boards, engineering groups, and even special courts to hear grievances had to be set up. To do the job, organizations had to be formed on both a national and county level. Local extension service people, foresters, and even local farmers were called on to help push the program through as quickly as possible.

Faced with a period of heavy expenditures for reparations and reconstruction, the government had to get as much as possible for its money.

"If we had had more machinery and more capital, perhaps we could have done more. But in those difficult days, we had to work with the tools we had at hand," Director Veikko Vennamo told me.

After 6 years of work in resettling its displaced farmers, Finland has almost completed the program. Nearly 5 million acres of land has been made into new farms. Nearly a half million acres of swampland on 28,000 farms has been drained and about 200,000 acres of new land cleared. More than 5,000 miles of new farm-to-market roads have been built to the 28,000 new farms, the 36,000 new part-time farms, and the 55,000 new dwelling sites. Altogether more than 100,000 farm buildings have been built, nearly 50,000 of these new homes. To this must be added about 18,000 buildings now being constructed, 8,000 of which will be homes. Among the

pine forests of north Finland stand 15,000 new farm buildings; 5,000 of the buildings are new farm homes.

Resettling one farmer out of every 10 in a country cannot help having a heavy impact on the farm and national economy. The cost in actual money is high. Up until the first of 1952 the government had spent more than a quarter of a billion dollars—a large sum for a nation of just over 4 million people.

The number of small farms has greatly increased since the resettlement program began. Today, Finland has fewer than 230 farms with more than 250 acres in crops, and a greatly reduced number of farms with more than 60 acres of cultivated land.

So far the smaller size of farms has not affected total crop production nor has the fact that Finland has only around 350,000 new acres of cleared and drained land to compensate for the 750,000 acres of farmland lost to the Russians. Thanks largely to heavy use of fertilizers, Finland's crops are running about 10 percent more than before the war.

There is no doubt, however, that the splitting up of the larger farms has reduced long-time efficiency on many farms. Farming with power machinery will be both difficult and expensive on the small farms and small fields.

However, as one of Finland's foremost agricultural economists, K. U. Pihkala, said, "We were compelled by very hard facts to adopt such a program . . . to redress the economic loss and social injustice that the war has heaped upon a large part of our people. To have done otherwise than to meet this challenge . . . might have brought consequences far more serious than the fiscal burdens and the farm economic maladjustments. . . ."

And, according to Director Vennamo, "It was the only way we could build internal peace among ourselves under a democratic, free enterprise system. . . ." There is little doubt that the quarter million Johannes Kaipainens and Kaimo Heikkis have been Finland's best answer to the persistent communist propaganda invading its borders.

Much of the farm work in Finland is still carried on by hand, for most of the farms are too small for economical mechanization. Small farms have multiplied since the war as pieces from large holdings have become the farms of war-displaced families.

Portugal Aids the United States In Fighting the Gypsy Moth

By JAMES O. HOWARD

Portugal is helping the United States to locate the gypsy moth so that this predator of New England forests can be subjected to lethal spray of insecticides from the air.

Presence of the gypsy moth in a forest is difficult to detect. In New England forests the moth is detected through a system of lures. These lures now come from Portugal. They depend on the biological fact that a male gypsy moth can detect the far-away presence of a female gypsy moth and can be depended on to wing his way to her.

The lures are contained in the last two segments on the bodies of female moths. Last summer, the female pupae of more than 300,000 gypsy moths collected from Portuguese forests were reared in incubators; when the adult moths emerged, the segments were clipped off their bodies, preserved in benzol, and shipped to the United States for use this year in the fight against the moth in New England and adjacent areas.

The importance of this fight is seen in the fact that the gypsy moth has caused the death of vast numbers of trees and retarded the growth of many others in the New England area, since 1869 when the moth was accidentally introduced into this country.

In the battle against this insect, which feeds on fruit, shade, and ornamental trees, as well as on forest trees, Federal and State authorities have worked out an effective method of eradicating infestations by aerial spraying of DDT. The borders of the infested area are being gradually pushed back. New Jersey is already free, as is all but a small area of Pennsylvania.

The effectiveness of the method, however, depends on knowing where precisely to spray, for if a single pair of moths is left alive the infestation may spread. To locate infestations, traps are baited with the lures and placed throughout the area to be checked. If so much as one male moth is caught, the region is scouted, the whereabouts of the moths located, and the infested area sprayed.

Mr. Howard is Agricultural Attache, American Embassy, Lisbon, Portugal.

The lures used in the traps must come from virgin female moths. Since it would be extremely difficult to catch unmated female moths in the field, the pupae are collected and reared in captivity. The period during which the pupae can be collected is very brief. The moth lays its eggs on trees in the summer, caterpillars hatch out in the following spring, feed on foliage for a period of about 8 weeks, then change to pupae, and attach themselves to the bark or leaves of trees and remain in that stage for only about 2 weeks. Then the moths emerge. Considerable skill is required in collecting pupae. Only female moths can be used; male pupae must not be collected, nor diseased pupae that may contaminate others. The pupae are kept in rearing trays until the moths emerge. Then the moths are transferred to aging cages for 24 hours. Next comes the delicate job of clipping the last two posterior segments, which contain the sex attractant. The clipped moth tips are then placed in benzol and shipped to the Agricultural Research Center at Beltsville, Md., for further processing.

Traps used to locate the elusive gypsy moths in New England forests are baited with lures from Portugal.

A Portuguese cork oak grove where gypsy moths are being collected for use in the campaign of moth detection in New England forests.

As the areas of heaviest infestation have been eliminated in the United States, it has become more and more difficult to obtain the required number of female moths. For that reason, an entomologist of the United States Department of Agriculture, Ralph F. Holbrook, was sent to Europe in 1951 to scout for areas of heavy gypsy moth infestation where collections of pupae might be made. Such an area was found in a sparsely settled cork oak region of southern Portugal, and plans were made to set up a collection project.

Setting up and staffing an establishment for this work was no small task. Consent of the landowner had to be secured and a laboratory and rearing room constructed. A crew of some 25 men had to be hired to collect pupae from the trees—men of some skill and willing to work 12-14 hours a day, 7 days a week, during the brief period of the pupae stage. Men with some entomological training were needed to supervise the collectors. Transportation was needed to move the workers to and from the field and to bring in the pupae twice a day during the collecting season. Personnel who were adept with their hands, had sufficient education to keep records, and could be quickly trained to follow a fast-moving scientific routine were required for the work of

Portuguese workers clip the last two segments of the gypsy moths, which contain the attractant that is used in the United States to locate gypsy moth infestations.

preparing the moth tips. There was serious question as to whether such personnel could be found in the remote area selected for the work.

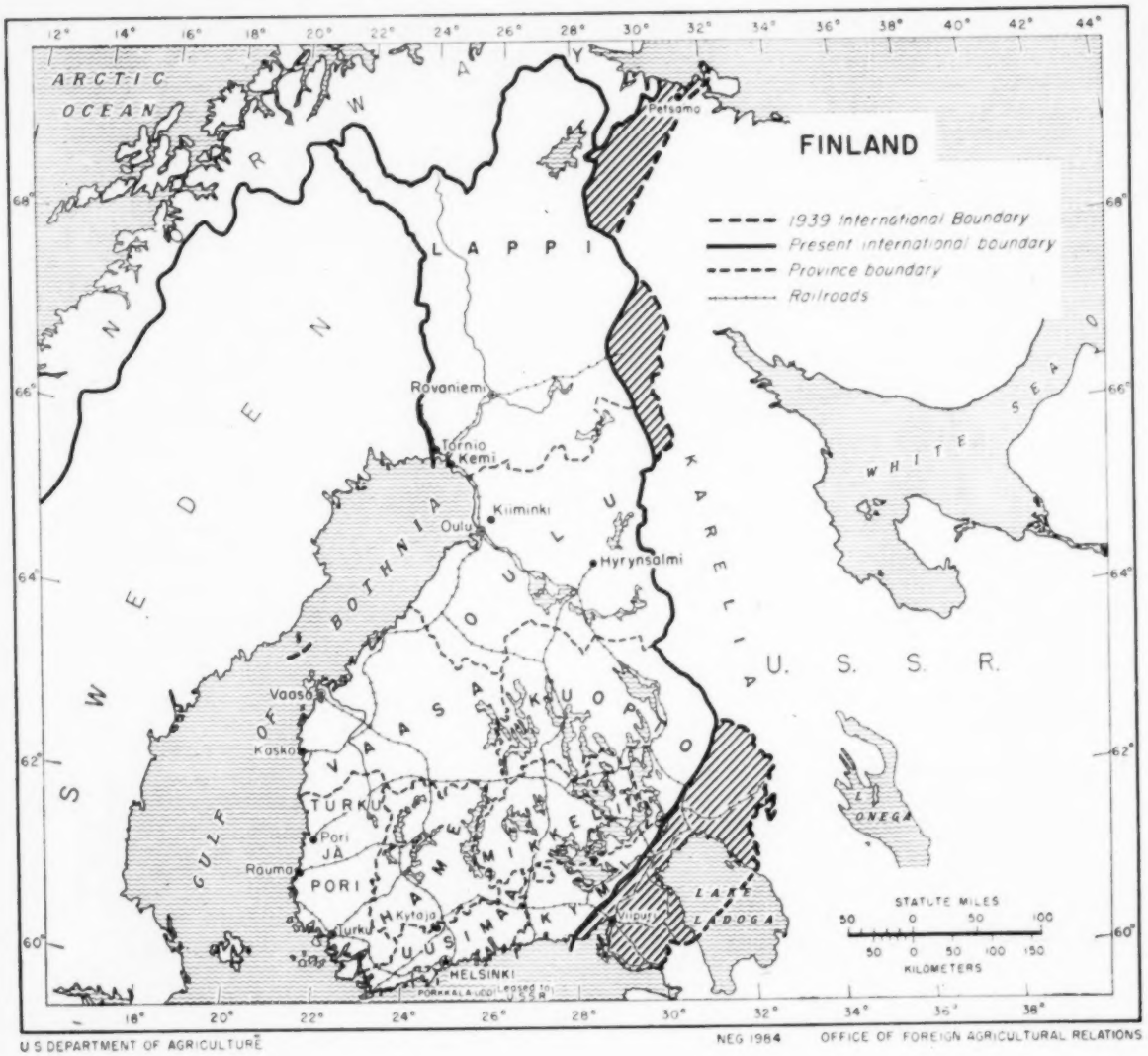
The United States entomologist who faced these tasks was agreeably surprised when he laid his problem before Engineer F. J. Mendes Frazao, Chief of the Portuguese Forest Service. Mr. Frazao recalled the help that the United States Department of Agriculture had extended to Portugal some 40 years ago when Portugal was introducing parasites in an attempt to control the gypsy moth, expressed his appreciation of United States aid to Europe since the war, and wound up by offering the full cooperation of his Service. He solved the transportation problem by making available a jeep and a pick-up truck for the 2 months they would be needed. The Forest Service, through Mr. Frazao, then solved the problem of assistant supervisors by turning over three trained foresters and four forest guards for the duration of the project. This type of assistance was extended in both 1951 and 1952, and the Forest Service would accept no remuneration.

Similar cooperation came from the brothers Posser de Andrade, owners of the large farm selected for the collection and rearing center. They arranged for the employ during the collecting work of 25 of their best qualified laborers, provided space in one of the farm buildings for the laboratory, and selected the best educated girls on the estate for laboratory workers. They made the entire facilities of the estate available for the duration of the project and arranged for services that ranged from gasoline from the town pumps to help from the local carpenters and mechanics. All the services were provided by the estate owners at a nominal cost.

This past season was highly successful. Three hundred and fifty thousand processed tips were obtained from the 560,000 pupae collected for a percentage of 62. Not only is this the highest percentage ever obtained during the many years that collecting and rearing work has been carried on, but the cost per tip (including travel and all other expenses of Mr. Holbrook and an assistant from the United States) is one of the lowest ever recorded.

Portugal will also benefit from this work. Its Forest Service now knows the United States method of gypsy moth control and, this summer, will use some of the attractant material chemically processed in the United States. But most of the help has been one way—help that the Portuguese have gladly given the United States.

An end-of-the-day scene in the gypsy moth laboratory set up on a Portuguese farm by United States entomologists. Next day the moth tips will be transferred from the large jars to the benzol-filled bottles.



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